U.S. EPA Landfill Methane Outreach Program Preliminary Screening Analysis Report for Marble Top Road Landfill

A landfill gas generation curve was developed for the Marble Top Road Landfill in Chickamauga, GA, using several parameters specific to the landfill and defaults from AP-42[1]. These data were entered into the EPA LandGEM[2] software to estimate landfill gas production, beginning with the year after the landfill opened. The values of these model input parameters are provided in Table 1. Landfill-specific data were obtained from an email[3], which is included in Appendix A. These data include the year the landfill opened, the current amount of waste-in-place, and the landfill closure year. The current waste-in-place amount was used to calculate an average annual waste acceptance rate for the landfill.

Also necessary for the model to run are the following parameters: L_o (methane generation potential), k (methane generation rate constant), and the percent volume of methane and carbon dioxide in the landfill gas. Defaults from AP-42 were used for L_o and k, and LandGEM software defaults were used for the percent methane and carbon dioxide. The AP-42 default value for k for non-arid areas was used because the email[3] (Appendix A) containing landfill-specific data indicated an average annual precipitation of greater than 25 inches for the area surrounding the landfill.

Collection of the landfill gas at its estimated extraction rate of 226 scfm in 2002 would be equivalent to any of the following annual environmental benefits for 2002:

Removing emissions equivalent to 5,000 cars
Planting 7,000 acres of forest
Offsetting the use of 115 railroad cars of coal
Preventing the use of 56,000 barrels of oil

Table 1: Model Input Parameters for the Marble Top Road Landfill

Model Parameter	Value	Units
Year Landfill Opened	1977	----
Landfill Closure Year	1998	----
Waste Capacity[a]	1,050,000	tons
Waste-In-Place	1,050,000	tons
Annual Waste Acceptance Rate[b]	50,000	tons/yr
Methane Generation Rate Constant (k)	0.04	1/yr
Methane Generation Potential (L_o)	3,203	ft^3/ton
Percent Methane in Landfill Gas	50	%
Percent Carbon Dioxide in Landfill Gas	50	%

[a] Assumed waste capacity to be the current waste-in-place, as landfill is closed.
[b] Calculated based on 1,050,000 tons of waste-in-place over the 21-year period of 1977 to 1997, as provided in Reference 3.

The estimated waste-in-place in tons and landfill gas generation in standard cubic feet per minute (scfm) for a 50-year period are shown in Table 2. Also provided is the estimated amount of landfill gas recovered over time, which was calculated using the assumption of an 75% collection rate. The graph was created using the landfill gas production and recovery data in Table 2. The curves demonstrate the landfill gas generation and recovery rates over time and the straight, vertical line indicates the current year.

Although LFG extraction appears to be somewhat small and, based on LandGEM, appears to be decreasing, there are some beneficial-use options available for the site. There is a possibility for implementing a small power generation project (i.e. a microturbine or a small reciprocating engine) or greenhouse (boiler option). Another factor to consider in determining an LFG beneficial-use project, would be the proximity of an end-user. Information shown in Attachment A indicates that the site is in a rural location. In the event that no viable end-users can be located and no favorable power purchase payments can be obtained, the site may want to consider power generation for onsite usage.

These projections have been prepared specifically for the Marble Top Road Landfill on behalf of the U.S. EPA Landfill Methane Outreach Program (LMOP), and are based on engineering judgement and represent the standard of care that would be exercised by a professional reasonably experienced in the field of landfill gas projections. LMOP and its contractors ERG and EMCON do not guarantee the quantity of available landfill gas, and no other warranty is expressed or implied. No other party is intended as a beneficiary of this work product, its content, or information embedded therein. Third parties use this information at their own risk. LMOP and its contractors ERG and EMCON assume no responsibility for the accuracy of information obtained from, compiled, or provided by other parties.

References

1. Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources. Chapter 2: Solid Waste Disposal. Section 2.4.4.1. U.S. EPA. November 1998. http://www.epa.gov/ttn/chief/ap42/ch02/final/c02s04.pdf

2. Landfill Gas Emissions Model, version 2.01. U.S. EPA. January 6, 1999. http://www.epa.gov/ttn/catc/products.html

3. Email correspondence from Adam Hayes, TriplePoint Engineers, Inc., to Brian Guzzone, U.S. EPA, Landfill Methane Outreach Program. March 4, 2002. Shown in Appendix A.

Appendix A

E-mail Containing Data for the Marble Top Road Landfill

"Adam J. Hayes" <ahayes@triplepointeng.com>

03/04/02 10:31 AM

To: Brian Guzzone/DC/USEPA/US@EPA
cc:
Subject: Landfill Input

Brian

Nice talking with you on Friday. I think I have some reasonable input data for the landfill methane project we discussed in NW Georgia. I would appreciate you running this data through your models and let me know what kind of gas production we might expect.

Here is the basic input information:

Year landfill opened:	1977
Landfill closed:	June 1998
Landfill Depth (average):	52.3 feet
Landfill Area:	30.89 acres
Total Landfill volume:	2.6 million cubic yards
MSW volume:	2.1 million cubic yards
Reported waste density:	1000 lbs/cubic yard (37.04 lbs/cu. Foot)

Average annual rainfall: 57.9 inches
Waste type: Mixed; municipal, with some C&D and industrial. No known hazardous waste.

As I mentioned, the County is interested in pursuing some type of gas-to-energy project if the economics make sense (i.e. they don't lose money). The landfill is located in a very rural area, so I do not know whether it is more feasible to look at gas or electricity sales as to evaluate the project economics. I would appreciate any suggestions you have on this issue.

I will be in the office most of the week. Call me if you have any questions or need more information.

Thanks for the help.

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